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Research Note

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DWARFMISTLETOE SURVEY IN NEZPERCE NATIONAL FOREST

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Surveys to determine the distribution and abundance of dwarfmistletoe (Arceuthobium spp.) in the west and east sides of the Nezperce National Forest were made in 1956 and 1959, respectively. A roadside and sample plot survey was completed in the west side in 1956. Survey of the east side in 1959 was limited to a roadside reconnaissance. The east side includes the Clearwater, Slate Creek, and Salmon River Ranger Districts; the west side includes the Elk City, Dixie, and Red River Districts. Both surveys included intermingled and adjacent alienated lands as well as national forest lands. The Moose Creek District was not surveyed because it lies wholly within the Selway-Bitterroot wilderness area. Three days were spent scouting for dwarfmistletoe in the Selway District, but no detailed information was recorded.

ROADSIDE SURVEY METHOD

The roadside survey consisted of traveling a portion of the roads in each ranger district at about 10 miles per hour. Frequent stops were made to examine the stands. Stands containing 10 percent or more of certain species were classified according to the extent and degree of dwarfmistletoe infection by tree species on the following scale:

Free - Stand free of dwarfmistletoe.
Light - Less than one-third of the trees infected.
Moderate - One-third to two-thirds of the trees infected.
Heavy - More than two-thirds of the trees infected.

All tree species were observed continuously for dwarfmistletoe infection. However, detailed information was recorded only for Douglas-fir, western larch, and lodgepole pine in the east side, and only for lodgepole pine and western larch in the west side. Whenever dwarfmistletoe was found in ponderosa pine in the east side and Douglas-fir in the west side, the approximate location and extent of the infected area were recorded (fig. 1).

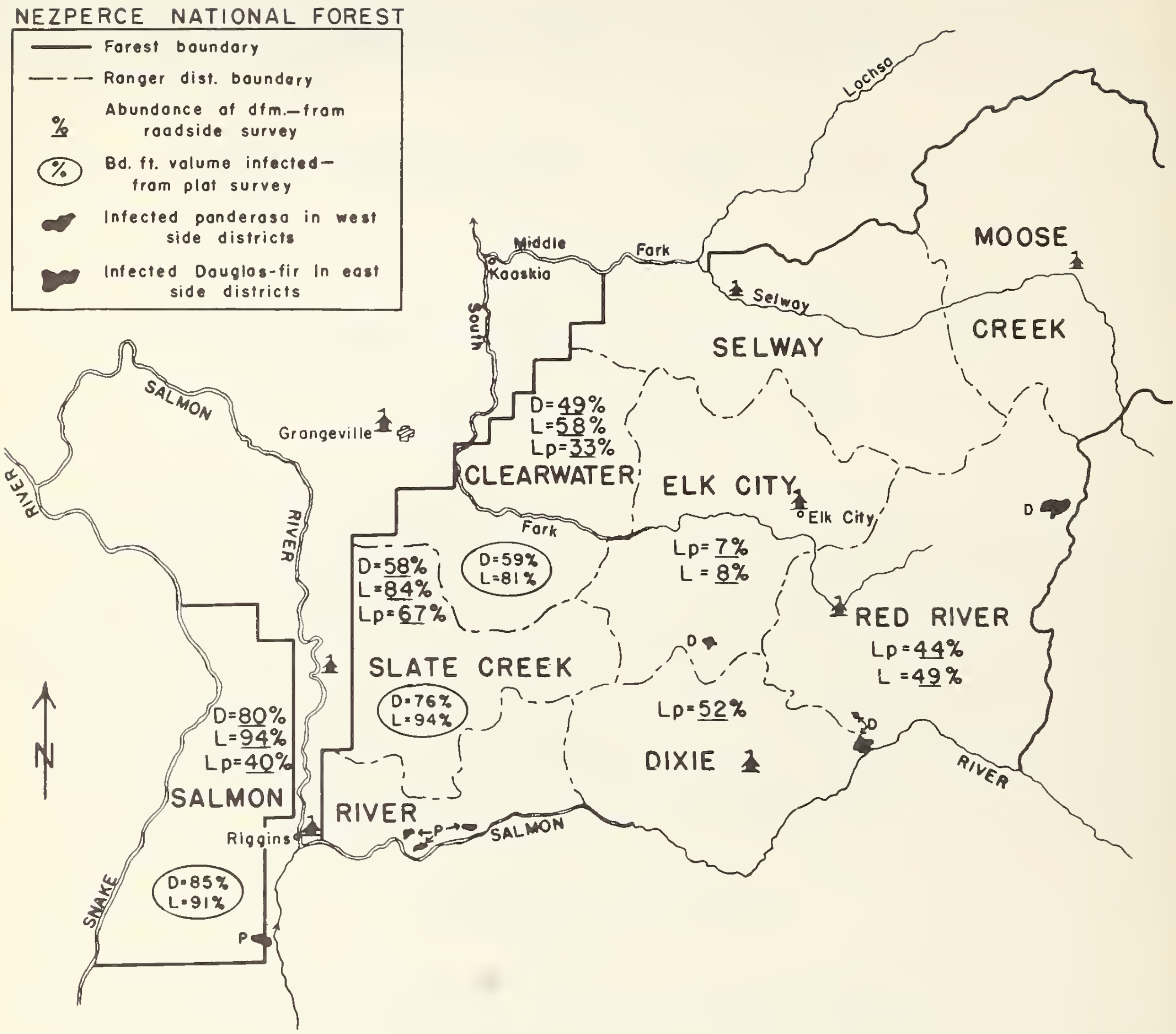

Figure 1.--Abundance of Douglas-fir (D), western larch (L), lodgepole pine (Lp), and ponderosa pine (P) dwarfmistletoe in the Nezperce National Forest as determined from a roadside strip and a sample plot survey.

Observations were made on a continuous strip, one or one-half chain wide, depending on stand density, along the right-hand side of the road. Odometer readings were noted and distances recorded to the nearest one-tenth mile whenever a change occurred in the degree of infection or in the tree species infected.

PLOT SURVEY METHOD

A sample plot survey was made in the west side ranger districts by establishing circular plots in infected stands. Some plots were taken within the roadside strips, and others were taken along lines run perpendicular to the roadsides. Most of the plots were one-fifth acre in size. Their distribution varied, depending on the various stand conditions and on the intensity of sampling considered necessary. The roadside plots were usually one-quarter to one-half mile apart; line plots were taken at the rate of eight per mile of line. Only merchantable Douglas-fir and western larch stands known to have infection were sampled.

Merchantable trees on each plot were tallied by species, diameter class, and number of merchantable logs. Each merchantable tree was classified in one of six dwarfmistletoe conditions as follows:

0 - dwarfmistletoe free
1 - lightly infected
2 - moderately infected
3 - heavily infected
4 - very heavily infected
5 - dead, showing signs of having had dwarfmistletoe as indicated by brooms or other evidence

Degree of infection was determined by rating the lower and upper one-half of the crown as either 1 (light infection) or 2 (heavy infection) and adding the two figures; e.g., a very heavily infected tree was one that had heavy infection in both upper and lower crowns.

Immature trees on each plot were tallied by species; by three size classes--large poles, small poles, and saplings; and by two health condition classes--dwarfmistletoe free or dwarfmistletoe infected.

RESULTS OF ROADSIDE SURVEY

The abundance of dwarfmistletoe infected stands by species on each ranger district was determined from roadside surveys (table 1 and fig. 1). A total of 569.7 miles of roadside was surveyed. Dwarfmistletoe was found along 307.3 miles or in 54 percent of the stands traversed. Dwarfmistletoe was present in 62 percent of the roadside strip traveled in Douglas-fir stands. Infection in western larch stands was 79 percent in the west side districts and 20 percent in the east side districts. Infection in lodgepole pine stands was 53 and 35 percent in the west and east sides.

The amount of dwarfmistletoe varied by ranger districts. On the west side, the Douglas-fir and western larch dwarfmistletoes were most frequent in the Salmon River District and lowest in the Clearwater District. Infected lodgepole pine stands were most plentiful on the Slate Creek District, being

Table 1.--Incidence of dwarfmistletoe shown by roadside survey in Nezperce National Forest, including intermingled and adjacent alienated lands

Tree species and ranger district	Miles roadside strip	Proportion of roadside miles traveled in:				
		Dwarfmistletoe infected stands				Dwarfmistletoe free stands
		Light	Moderate	Heavy	Total	
	Number	Percent				
		WEST SIDE RANGER DISTRICTS				
Douglas-fir						
Clearwater	117.4	22	17	10	49	51
Slate Creek	50.4	18	28	12	58	42
Salmon River	101.4	22	34	24	80	20
All districts	269.2	21	26	15	62	38
Western larch						
Clearwater	15.5	29	19	10	58	42
Slate Creek	24.6	27	40	17	84	16
Salmon River	13.0	5	27	62	94	6
All districts	53.1	22	31	26	79	21
Lodgepole pine						
Clearwater	23.2	12	14	7	33	67
Slate Creek	43.1	33	30	4	67	33
Salmon River	9.7	18	14	8	40	60
All districts	76.0	25	23	5	53	47
All species						
Clearwater	156.1	21	17	9	47	53
Slate Creek	118.1	25	32	10	67	33
Salmon River	124.1	20	32	26	78	22
All districts	398.3	22	26	15	63	37
		EAST SIDE RANGER DISTRICTS				
Western larch						
Elk City	12.2	1	4	4	8	92
Dixie	0	-	-	-	-	-
Red River	4.7	23	13	13	49	51
All districts	16.9	7	7	6	20	80
Lodgepole pine						
Elk City	46.7	2	3	2	7	93
Dixie	39.2	17	15	20	52	48
Red River	68.6	17	13	14	44	56
All districts	154.5	13	10	12	35	65
Forest total	569.7	19	21	14	54	46

twice that on the Clearwater and 1.7 times that on the Salmon River District. In the east side districts, the abundance of lodgepole pine dwarfmistletoe was moderate to heavy in the Dixie and Red River Districts (52 and 44 percent) and very light (7 percent) in the Elk City District.

In general, about one-third of the infected stands, regardless of ranger district or tree species, were heavily infected, one-third moderately infected and one-third lightly infected. The greatest departure from this occurred in lodgepole pine in the west side districts where heavily damaged stands seldom occurred.

In addition to the widespread distribution of the Douglas-fir, western larch, and lodgepole pine dwarfmistletoes in the west side districts, several infected ponderosa pine stands occur in the southernmost part of the forest on the slopes overlooking the Salmon River (fig. 1). The Douglas-fir dwarfmistletoe is not widespread in the east portion of the forest, but several infected stands were found (fig. 1).

Observations made during a general scouting in the Selway District indicate that dwarfmistletoe is not a severe problem on this district except in a few local areas. The Douglas-fir dwarfmistletoe is especially severe around Crane Hill, and some infection occurs in this species in other areas along the western border of the district. Very little western larch grows in the Selway District, but wherever it is present, some infection usually is found.

RESULTS OF PLOT SURVEY

Two hundred sample plots were established in mature Douglas-fir and larch stands. These plots sampled 17 different locations in the Clearwater, Slate Creek, and Salmon River Districts. The results of this plot survey have been summarized (fig. 1 and tables 2 and 3).

The plots contained about 380,000 bd. ft. of merchantable Douglas-fir and western larch. Infected trees made up 79 percent of this volume. Infected trees contained 78 percent of the merchantable Douglas-fir volume and 92 percent of the merchantable larch volume (table 2). There were 8,074 bd. ft. in infected Douglas-fir trees and 1,131 bd. ft. in infected larch trees per acre. Recently killed trees contained 8 percent of the total Douglas-fir volume and 4 percent of the total larch volume. This mortality was based on the dead standing trees having bark and limbs more or less intact (or recent windthrows) that showed signs of dwarfmistletoe infection prior to death.

The amount of infection decreased as tree size decreased but was appreciable even in saplings (table 3). For example, in Douglas-fir in the Clearwater District, trees containing 59 percent of the merchantable volume were infected, and 39, 25, and 15 percent of the trees were infected in the large

Table 2.--Incidence of dwarfmistletoe in merchantable stand volume from 200 sample plots taken in infected Douglas-fir and larch stands, west side districts, Nezperce National Forest, 1956

Tree species and ranger district	Total merchantable volume	Dwarfmistletoe infected volume[1]: Light to moderate	Heavy to very heavy	Dead[2]	Total	Dwarf-mistletoe free volume
	M.b.m.	Percent				
Douglas-fir						
Clearwater	31.7	44	10	5	59	41
Slate Creek	191.9	42	26	8	76	24
Salmon River	115.6	41	34	10	85	15
All districts	339.2	42	28	8	78	22
Western larch						
Clearwater	1.5	0	67	14	81	19
Slate Creek	11.1	47	46	1	94	6
Salmon River	27.8	41	46	4	91	9
All districts	40.4	41	47	4	92	8

[1] Based on board-foot log volume, Scribner.

[2] Does not represent the total dead volume but only recent mortality in which dwarfmistletoe was considered to be a major factor contributing to death.

pole, small pole, and sapling size classes, respectively. This decreasing incidence of dwarfmistletoe with tree size is to be expected because smaller trees expose less target area for establishment of infections. Also, the smaller trees are often of a younger age class and, therefore, have been subjected to infection for a shorter time. Some infected trees in the younger ages were probably classed as free because of latent infections--*i.e.*, infections in which dwarfmistletoe is already established but has not produced shoots.

COMPARISON OF ROADSIDE AND PLOT SURVEY

Indications are that a relation exists between the results of the roadside and plot surveys. The distribution and abundance of dwarfmistletoe infection observed from a roadside survey correspond generally with percentage of trees and volume infected as shown by sample plots. The roadside survey shows that 65 percent of the merchantable Douglas-fir stands, in all districts combined, are infected. The plot survey shows that in these stands 72 percent of the merchantable trees containing 78 percent of the merchantable volume is infected. Comparable values for western larch show that 84 percent of the merchantable stands have dwarfmistletoe and that in these stands infection occurs in 86 percent of the trees and 92 percent of the volume.

Table 3.--Incidence of dwarfmistletoe in immature trees in 200 sample plots taken in infected Douglas-fir and larch stands, west side districts, Nezperce National Forest, 1956

Tree species and ranger district	Percentage of immature trees infected with dwarfmistletoe in		
	Large poles	Small poles	Saplings
Douglas-fir			
Clearwater	39 (1)[1]	25 (2)	15 (3)
Slate Creek	66 (4)	60 (5)	45 (4)
Salmon River	60 (4)	58 (6)	45 (2)
All districts	60 (4)	53 (5)	39 (3)
Western larch			
Clearwater	--	--	--
Slate Creek	100 (10)	100 (50)	--
Salmon River	68 (6)	44 (10)	--
All districts	80 (8)	63 (23)	--

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[1] Percentages in parentheses refer to mortality; for example, 60 percent of the Douglas-fir large-sized poles were infected, 4 percent of which were dead and showed signs of having been infected.

SUMMARY

A survey of the distribution and abundance of dwarfmistletoes was made in the west portion of the Nezperce National Forest in 1956 and in the east portion in 1959. The survey consisted of observations of dwarfmistletoe occurrence along roadside strips and of a more detailed study of dwarfmistletoe damage on sample plots established in infected stands.

Survey results emphasize the magnitude of the dwarfmistletoe problem in the Nezperce National Forest. Survey of a strip along 569.7 miles of roadside showed that 54 percent of the forest contained infected trees. Douglas-fir in the west side of the forest was infected on 62 percent of the roadside strip on which this species occurred, western larch on 79 percent, and lodgepole pine on 53 percent. Comparative values for the latter two species in the east side of the forest were: western larch 20 percent and lodgepole pine 35 percent.

More than one-third million bd. ft. of merchantable-sized Douglas-fir and western larch were present on the 200 sample plots established in the west side. Seventy-nine percent of this volume was in infected trees, as was 78 percent of the Douglas-fir volume and 92 percent of the larch volume. In the immature trees on the plots, 53 percent of the Douglas-fir trees and 51 percent of the larch trees were infected.